REMARKS

Claims 1-32 are of record.

The allowability of the subject matter of claims 11-12, 16, 23 and 26-27 is noted.

The improper dependency of claim 32 has been corrected.

Claim 1 is the sole independent claim of the application. All of the other claims depend from it directly or ultimately.

Claims 1, 2, 8-10, 13-15, 17-18, 20-22, 25, 28-29 and 31-32 stand rejected over the Eschauzier, et al. patent, U.S. 6,160,450 in view of the Eschauzier admitted prior art (AAPA).

It is agreed that the Eschauzier patent discloses a microphone preamplifier comprising:

- a differential input stage with a first (in p) and a second (in m) input terminal;
- an output stage with an output terminal, where the microphone preamplifier is integrated on a semiconductor substrate;
- a feedback circuit; and
- where the second input terminal ('in m') provides an input for a microphone signal.

As stated by the Examiner, this configuration is disclosed in fig. 4 and in col. 3, line 66 through col. 4, line 32.

Applicant contends that the point of novelty of claim 1 is that the feedback circuit has a low-pass frequency transfer function and in that the feedback circuit and the microphone signal is coupled to different inputs of the amplifier, i.e., the feedback circuit is coupled between the output terminal and the first input terminal and the second input terminal provides an input for a microphone signal. As stated by the Examiner, Eschauzier fails to disclose the claimed feature that the feedback circuit has a low-pass frequency transfer function, and is coupled between the output terminal and the first input terminal and integrated on the semiconductor substrate; where the second input provides an input for a microphone signal.

The Examiner takes the position that this feature is disclosed by the AAPA and refers in this respect to Figs. 2 and 3; col. 2, lines 1-29 (see last sentence of first paragraph, page 3 of the Office Action). Applicants respectfully submit that this feature is not disclosed.

Starting with AAPA Fig. 2, it can be seen that there is disclosed a feedback path coupled between the output terminal (out) and the first input terminal (in p), whereas the second input terminal (in m) provides an input for a microphone signal. However, Fig. 2 does not disclose the characteristics of the feedback path disclosed on Fig. 2.

Turning to the description and the first eight lines of col. 2 that refer to Fig. 2 of the AAPA, it is stated that "feedback can be used to control the gain, improve the linearity and compensate for temperature variations". These advantages can be achieved by a conventional feedback circuit without a filter. To obtain these advantages, a skilled person will search for a circuit configuration being as compact as possible – thus involving as few components as possible. The skilled person will thus realize that a feedback circuit without filter means is meant.

Further, as understood from the first paragraph of col. 2 of the AAPA, the circuit shown in Fig. 2 will not function as desired (line 15, col. 2) unless a DC bias loop with a low-pass filter is added. Consequently, the person skilled in the art is taught that the circuit of Fig. 2 is not a possible solution.

A DC bias loop is added in Fig. 3 of the AAPA, as stated in line 19, col. 2, and is shown as a feedback path comprising an amplifier in series with a low-pass filter (LPF). Further, in the same paragraph, it is stated that "in order to get a good low frequency response, the components in the low pass filter (...) much be high in value and, therefore, relatively large in size and thus implemented as external components. Moreover, due to the large capacitance of the LPF capacitor C1, a long start-up time is required (...)". For small sized microphones to be manufactured in high volumes and at low cost for consumer electronics equipment, the use of external components is unacceptable. Thus the skilled person will realize that the circuit of Fig. 3 is not a possible solution since the low pass filter introduces ia a long start-up time.

The term "long start-up time" is defined in Eschauzier (column 2, line 27). In the sentence before, Eschauzier states (column 2, lines 22-27):

> However, in order to get a good low frequency response, the components in the low-pass filter must be high in value. . . ".

This means that the cut-off frequency of the low-pass filter (LPF in Fig. 3) is at a low frequency and hence that the time constant related to the impulse response of the low-pass filter (LPF) seen from the circuit node at which the microphone signal is provided is "long". When either power to the circuit is turned on or a loud sound impact the microphone, a large voltage level will occur at the circuit node - and due to the impulse response of the low-pass filter it will stay for a long time. Meanwhile, the amplifier will be saturated (causing clipping the output signal) and hence it will not work as an amplifier for a "long" period of time. This is undesired.

This problem is addressed in the present application at page 3 (last paragraph before the section "Related Art"):

> If the bias resistor is made very large then the noise from the resistor will be high pass filtered and the in-band noise will be very low. This has the effect though that the lower bandwidth limit of the amplifier will be very low. This can be a problem as the input of the amplifier will settle at a nominal value only after a very long period of time after power up. Additionally, signals with intensive low frequency content arising from e.g. slamming of a door or infra sound in a car can overload the amplifier. Another related problem is small leakage currents originating from mounting of the die inside a microphone module. Such currents will due to the extreme input impedance establish a DC offset. This will reduce the overload margin of the amplifier.

A solution to this problem is provided in accordance with claim 1.

To further explain that the prior art does not teach the subject matter of claim 1, it should be considered that Fig. 3 of the AAPA discloses two different feedback paths; the first one being of a conventional type and the other one being a DC servo. The first feedback path is denoted 'FEEDBACK' and is coupled between the output terminal (out) and the input terminal (in m). The second feedback path comprises a low-pass filter denoted 'LPF' and is coupled between the output terminal (out), via a further amplifier, and the input terminal (in p). This input terminal (in p)

provides an input for a microphone signal. Thus, the input terminal (in p) receives both the microphone signal and a signal from the low-pass filter.

Thus, contrary to the Examiners statement, both Eschauzier and AAPA fail to disclose the feature of a feedback path with a low-pass frequency transfer function, coupled between the output terminal and the first input terminal and integrated on the semiconductor substrate; where the second input provides an input for a microphone signal.

Considering the teaching of Eschauzier and AAPA as a whole, the person skilled in the art will realize that DC biasing is needed and that the low pass filter (LPF) introduces ia a long start-up time. The person skilled in the art is not given any solution to this problem except the solution of Eschauzier, where feedback without filter means is disclosed to provide proper bias. Consequently, the person skilled in the art would not have found it obvious to arrive at the invention as set forth in claim 1.

Therefore, claim 1 is patentable over the applied references and should be allowed.

The other claims rejected on this combination of references define further features of the invention of claim 1 which add to its novelty. Therefore, these claims also are patentable.

Claims 3 and 4 are rejected over Eschauzier and the AAPA in view of Tsinker, U.S. 6,150,875. Tskinker is added for teaching a filter with a zero and a pole with the zero located at a higher frequency than the pole.

Claims 5-7 are rejected over Eschauzier in view of the AAPA and further in view of Bhandari, et al., U.S. 6,424,480, which is cited to show different gain levels.

Claims 19 and 30 are rejected over Eschauzier in view of the AAPA and further in view of French, et al., U.S. 5,337,011, which is cited for teaching a bias element formed by cross-coupled diodes.

Claim 24 is rejected over Eschauzier in view of the AAPA and further in view of Huckins, et al., U.S. 6,731,163.

In each of the above rejections where a third reference is added, such reference does not cure the basic defect of the rejection of main claim 1 for the reasons given above relative to this claim. The claims in these rejections add further novelty to the invention of claim 1. Therefore, they also are patentable and should be allowed.

All of the claims of the application are now in condition for allowance. Therefore, the application should be passed to issue.

Prompt and favorable action is requested.

Dated: February 25, 2008

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